Searching for, finding, and fixing genetic diseases: we can't afford not to

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Genetic diseases cost the livestock industry millions every year. It is estimated that every animal carries 20-100 genetic disease causing alleles and that every animal born carries 50 spontaneous mutations, though not all are detrimental to the viability or productivity of the animal, in fact, some may be beneficial. Since 2013, 650,000 Irish cattle have been genotyped and allele frequencies were analysed to calculate carrier frequency on 33 different diseases using the International Dairy and Beef (IDB) SNP Chip. Economic losses and gains will be calculated for disease and trait genes tested on the IDB SNP chip. Genotyping costs have shrunk dramatically and made developing a 'Breed Smarter Strategy' realistic for the Irish population. Implementation of this strategy, will allow the industry to retain high value animals even if they carry known adverse traits through mating them with animals that do not carry those genes. The idea behind the program has incentivised ICBF to seek out new disease SNP in the population. A survey was developed allowing farmers and veterinarians to report genetic defects and provide samples to identify diseases causing economic loss. The limitations in a program like this are removing the stigma linked with having an atypical animal, and identifying diseases that are genetic. While implementation of this program has been slow, articles online and in popular press have increased the frequency of reports every year. After a few key diseases were identified, DNA from affected animals was sent off for whole genome sequencing and analysis of the genomes will commence to identify candidate causal mutations. This is a constant process as new genetic diseases appear every year. Success of the program will save the industry millions of euros annually once new SNP are identified and added to the next version of the IDB chip.

Influence of live weight and genotype on efficiency of dairy cows

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The aim was firstly to evaluate the influence of live weight on feed and energy efficiency of dairy cows and secondly to analyse the current state of population within the Efficient Cow Project of the Austrian Cattle Breeding Association. Data of Fleckvieh (FV), Holstein (HF) and Brown Swiss (BS) dairy cows were recorded on-farm (161 farms) at each performance testing during a whole year. Feed intake was estimated (6,480 cows) using cow individual (diet) information. The relationship of milk yield to live weight was shown to be non-linear. Milk yield decreased after the live weight class of 750 kg for HF and BS but less dramatically and later for FV at 800 kg. This resulted in an optimum live weight for feed and energy efficiency. BS and HF had highest efficiency in a narrower and lighter live weight range (550 to 700 kg) due to a stronger curvature of the parabolic curve. Contrary to this efficiency of FV did not change as much as of the dairy breeds with increasing live weight. So FV had a similar efficiency in a range of 500 to 750 kg. Therefore live weight seems to influence efficiency of dairy breeds more than of dual purpose breeds. The difference of breeds vanished when live weight ranged between 750 and 800 kg. The average live weights of the breeds studied (FV 728 kg, BS and HF 656 kg) are in the optimum range. FV is located at the upper end of the decreasing part. Furthermore a cow which is heavier has to produce more milk based on a higher concentrate level to be as efficient as a lighter cow. In conclusion an optimum range of live weight for efficiency exists due to the non-linear relationship of milk yield and live weight. Milk yield and efficiency of cows with a high genetic potential of milk production depend more on live weight than of dual purpose cows. Cows with medium weights within population are the most efficient ones. Heavy cows (>750 kg) produce even less milk. A further increase of dairy cows' live weights should hence be avoided.